SECTION PS

POWER STEERING SYSTEM

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PRECAUTIONS

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Precautions for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

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The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions for Steering System

AGS000LA

- In case of removing steering gear, make the final tightening with grounded and unloaded vehicle condition, and then check wheel alignment.
- Observe the following precautions when disassembling.
  - Before disassembly, thoroughly clean the outside of the unit.
  - Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
  - For easier and proper assembly, place disassembled parts in order on a parts rack.
  - Use nylon cloth or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.
  - Do not reuse non-reusable parts.
  - Before assembling, apply the specified grease to the directed parts.

PREPARATION

PFP:00002

Special Service Tools [SST]

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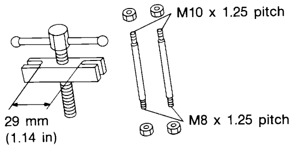
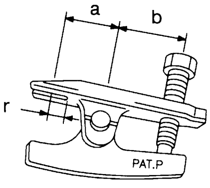
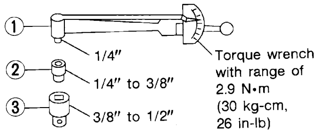
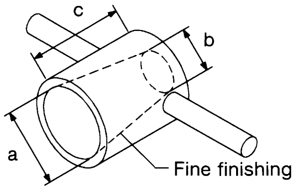
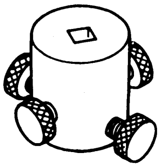
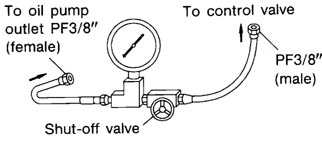
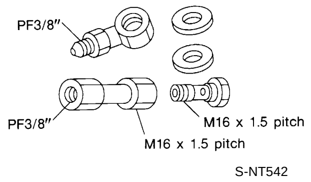
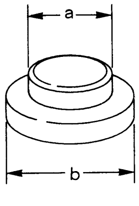
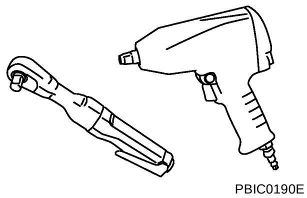
Tool number (Kent-Moore No.) Tool name		Description
ST27180001 (J-25726-A) Steering wheel puller	 S-NT544	Removing steering wheel
HT72520000 (J-25730-A) Ball joint remover a: 33 mm (1.30 in) b: 50 mm (1.97 in) r: 11.5 mm (0.453 in)	 NT546	Removing steering outer socket
ST3127S000 (See J-25765-A) Preload gauge 1. GG9103000 (J-25765-A) Torque wrench 2. HT62940000 (–) Socket adapter 3. HT62900000 (–) Socket adapter	 S-NT541	Inspecting sliding torque, steering torque, and rotating torque for ball joint
KV48104400 (—) Teflon ring correcting tool a: 50 mm (1.97 in) dia. b: 36 mm (1.42 in) dia. c: 100 mm (3.94 in)	 S-NT550	Installing rack Teflon ring
KV48103400 (—) Torque adapter	 ZZA0824D	Inspecting rotating torque
KV48103500 (J-26357) Pressure gauge	 S-NT547	Measuring oil pump relief pressure

Tool number (Kent-Moore No.) Tool name		Description
KV48102500 (J-33914) Pressure gauge adapter		Measuring oil pump relief pressure
ST35300000 (—) Drift a: 45.1 mm (1.776 in) dia. b: 59.0 mm (2.323 in) dia.		Installing oil seal

Commercial Service Tools

AGS000K9

Tool number Tool name		Description
Power tool		Removing wheel nuts

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

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NVH Trouble Shooting Chart

AGS000KA

Use chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page			PS-7	PS-7	PS-22	PS-22	PS-22	PS-7	PS-9	PS-9	EM-11	PS-9	PS-15	PS-17	PS-14	PS-12	PS-17	NVH in PR section	NVH in RFD section	NVH in FAX, RAX, FSU, RSU section	NVH in WT section	NVH in WT section	NVH in FAX, RAX section	NVH in BR section
Possible cause and suspected parts			Fluid level	Air in hydraulic system	Outer socket ball joint swinging force	Outer socket ball joint rotating torque	Outer socket ball joint end play	Steering fluid leakage	Steering wheel play	Steering gear rack sliding force	Drive belt looseness	Improper steering wheel	Improper installation or looseness or tilt lock lever	Mounting rubber deterioration	Steering column deformation or damage	Improper installation or looseness of steering column	Steering linkage looseness	PROPELLER SHAFT	DIFFERENTIAL	AXLE and SUSPENSION	TIRES	ROAD WHEELS	DRIVE SHAFT	BRAKES
Symptom	Steering	Noise	×	×	×	×	×	×	×	×	×							×	×	×	×	×	×	×
		Shake										×	×	×				×		×	×	×	×	×
		Vibration										×	×	×	×	×		×		×	×		×	
		Shimmy										×	×	×			×			×	×	×		×
		Judder												×			×			×	×	×		×

×: Applicable

POWER STEERING FLUID

PFP:KLF20

Checking Fluid Level

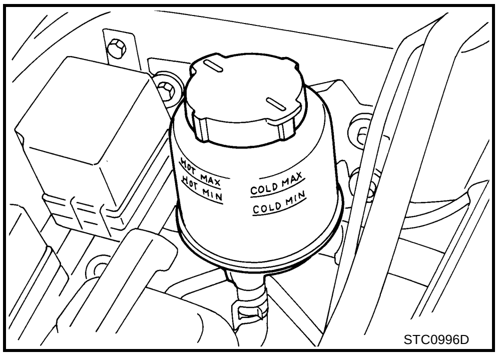
AGS000KB

- Check fluid level with engine stopped.
- Make sure that fluid level is between MIN and MAX.
- Fluid levels at HOT and COLD are different. Do not confuse them.

  HOT : Fluid temperature 50 - 80°C (122 - 176°F)

  COLD : Fluid temperature 0 - 30°C (32 - 86°F)

  CAUTION:
  - **The fluid level should not exceed the MAX line. Excessive fluid will cause fluid leakage from the cap.**
  - **Do not reuse drained power steering fluid.**
  - **Recommended fluid is Genuine Nissan PSF or equivalent.**



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Checking Fluid Leakage

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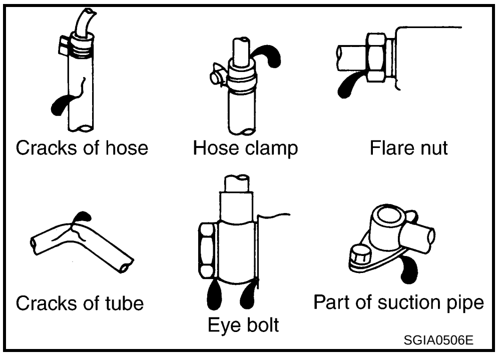
Check hydraulic connections for fluid leakage, cracks, damage, looseness, or wear.

1. Run engine until the fluid temperature reaches 50 to 80°C (122 to 176°F) in reservoir tank, and keep engine speed idle.
2. Turn steering wheel several times from full left stop to full right stop.
3. Hold steering wheel at each lock position for five seconds and carefully, check for fluid leakage.

   CAUTION:
   Do not hold the steering wheel in a locked position for more than 10 seconds. (There is the possibility that oil pump may be damaged.)



SGIA0506E

4. If fluid leakage at connections is noticed, then loosen flare nut and then retighten. Do not over tighten connector as this can damage O-ring, washer and connector.
5. If fluid leakage from oil pump is noticed, check oil pump. Refer to PS-28, "POWER STEERING OIL PUMP" .
6. Check steering gear boots for accumulation of fluid indicating from steering gear.

Air Bleeding Hydraulic System

AGS000KD

If air bleeding is not complete, the following symptoms can be observed.

- Bubbles are created in reservoir tank.
- Clicking noise can be heard from oil pump.
- Excessive buzzing in the oil pump.

  NOTE:
  Fluid noise may occur in the valve or oil pump. This does not affect performance or durability of the system.

1. Turn steering wheel several times from full left stop to full right stop with engine off.

   CAUTION:
   Turn steering wheel while filling reservoir tank with fluid so as not to lower fluid level below the MIN line.
2. Start engine and hold steering wheel at each lock position for 3 seconds at idle to check for fluid leakage.
3. Repeat step 2 above several times at approximately 3 second intervals.

   CAUTION:
   Do not hold the steering wheel in a locked position for more than 10 seconds. (There is the possibility that oil pump may be damaged.)
4. Check fluid for bubbles and white contamination.

5. Stop engine if bubbles and white contamination do not drain out. Perform step 2 to 3 above after waiting until bubbles and white contamination drain out.
6. Stop the engine, and then check fluid level.

STEERING WHEEL

PFP:48430

On-Vehicle Inspection and Service

AGS000KE

CHECKING CONDITION OF INSTALLATION

- Check installation conditions of steering gear assembly, front suspension, axle and steering column.
- Check if movement exists when steering wheel is moved up and down, to the left and right and to the axial direction.

Steering wheel axial end play : 0 mm (0 in)

- Check steering gear assembly mounting nuts and bolts for looseness. Refer to PS-17, "COMPONENT" .

CHECKING STEERING WHEEL PLAY

- Turn steering wheel so that front wheels come to the straight-ahead position. Start engine and lightly turn steering wheel to the left and right until front wheels start to move. Measure steering wheel movement on the outer circumference.

Steering wheel play : 0 - 35 mm (0 - 1.38 in)

- When the measurement value is outside the standard value, check backlash for each joint of steering column and installation condition of power steering gear.

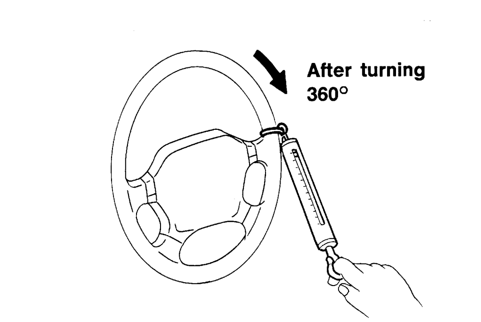
CHECKING NEUTRAL POSITION STEERING WHEEL

- Make sure that steering gear assembly, steering column and steering wheel are installed in the correct position.
- Perform neutral position inspection after wheel alignment. Refer to FSU-6, "Wheel Alignment Inspection" .
- Set vehicle to the straight-ahead position and confirm steering wheel is in the neutral position.
- Loosen outer socket lock nut and turn inner socket to left and right equally to make fine adjustments if steering wheel is not in the neutral position.

CHECKING STEERING WHEEL TURNING FORCE

1. Park vehicle on a level and dry surface, set parking brake.
2. Start engine.
3. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 50 to 80°C (122 to 176°F).]

   NOTE:
   Tires need to be inflated normal pressure.
4. Check steering wheel turning force when steering wheel has been turned 360° from neutral position.



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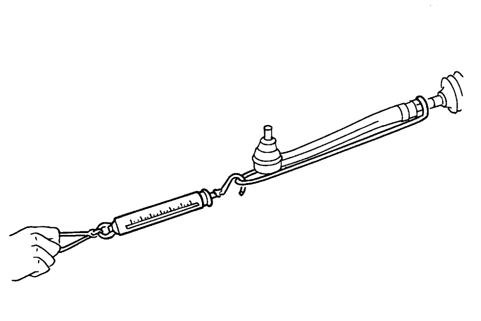
Steering wheel turning force : 36 N (3.7 kg, 8.2 lb) or less

5. If steering wheel turning force is out of the specification, check rack sliding force.

a. Disconnect lower shaft and steering knuckle from steering gear assembly.

b. Start and run engine at idle to make sure steering fluid has reached normal operating temperature.

c. While pulling outer socket slowly in ±11.5 mm (±0.453 in) range from neutral position, make sure rack sliding force is within specification.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Rack sliding force

: 255 - 294 N (26 - 30 kg, 57 - 66 lb)

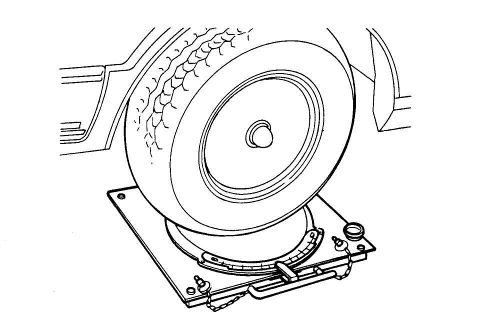
d. Check sliding force outside above range.

Rack sliding force: 294 N (30 kg, 66 lb) or less

e. If rack sliding force is not within specification, overhaul steering gear assembly.

CHECKING FRONT WHEEL TURNING ANGLE

- Check front wheel turning angle after toe-in inspection. Place front wheels on turning radius gauges and rear wheels on stands. Check the maximum inner and outer wheel turning angles for LH and RH road wheels.



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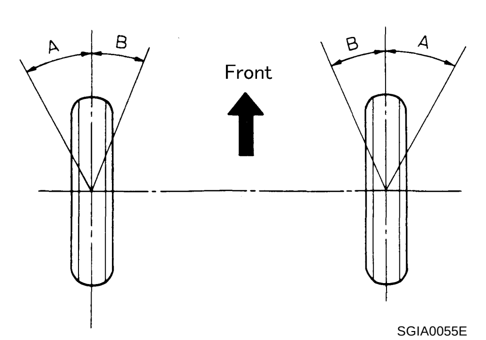
- With the engine at idle, turn steering wheel from full left stop to full right stop and measure the turning angles.

Inner wheel (Angle: A)	**Minimum**	**36°00′ (36.0°)**
	Nominal	**39°00′ (39.0°)**
	Maximum	**40°00′ (40.0°)**
Outer wheel (Angle: B)	**Nominal**	**31°00′ (31.0°)**



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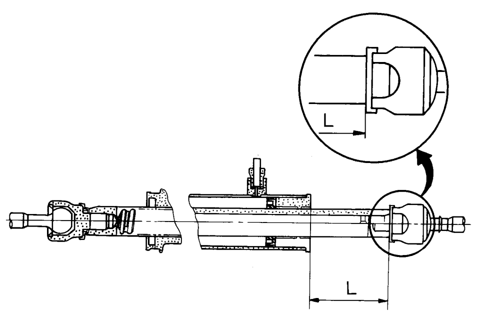
- Measure rack stroke if angles are outside the specified value.

  Rack stroke "L" : 66.5 mm (2.618 in)

- Disassemble steering gear to check the cause that rack stroke is outside of the standard.
- Steering angles are not adjustable. Check steering gear, steering column and front suspension components for wear or damage if any of the turning angles are different from the specified value. Replace any of them, if any non-standard condition exists.



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Removal and Installation

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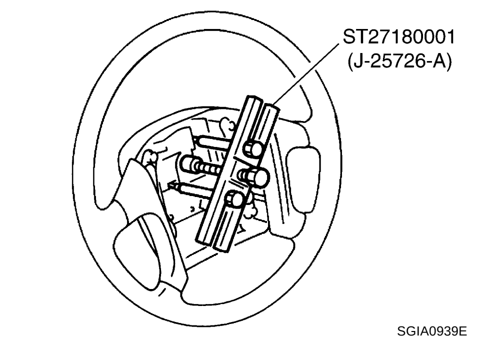
REMOVAL

1. Set front wheels in the straight-ahead direction.
2. Remove driver air bag module from steering wheel. Refer to SRS-32, "DRIVER AIR BAG MODULE" .
3. Remove steering wheel lock nut after steering is locked.
4. Remove steering wheel with the steering wheel puller [SST].



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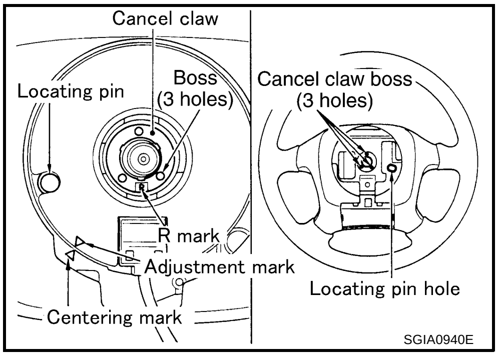
INSTALLATION

Install in the reverse order of the removal. For tightening torque, refer to PS-12, "COMPONENT" .

NOTE:

- When reconnecting spiral cable, fix cable with a tape so that fixing case and rotating part keep aligned. This will omit neutral position alignment procedure during spiral cable installation.
- Neutral position (refer to figure)... Gently turn spiral cable clockwise until it comes to the stop. Then turn it counterclockwise (approximately 3.0 turns) until centering mark is aligned with adjustment mark. (Service part is fixed in neutral position with stopper. It can be installed onto steering wheel without alignment once stopper is removed.)



CAUTION:

- **Place steering wheel as follows: Front wheels in straight-ahead position. R mark on the cancel claw faces down. 3 bosses align with 3 holes behind steering wheel assembly. Make sure that spiral cable is placed in neutral position and that locating pin on the left of the spiral cable is aligned with the locating pinhole behind the steering wheel assembly.**

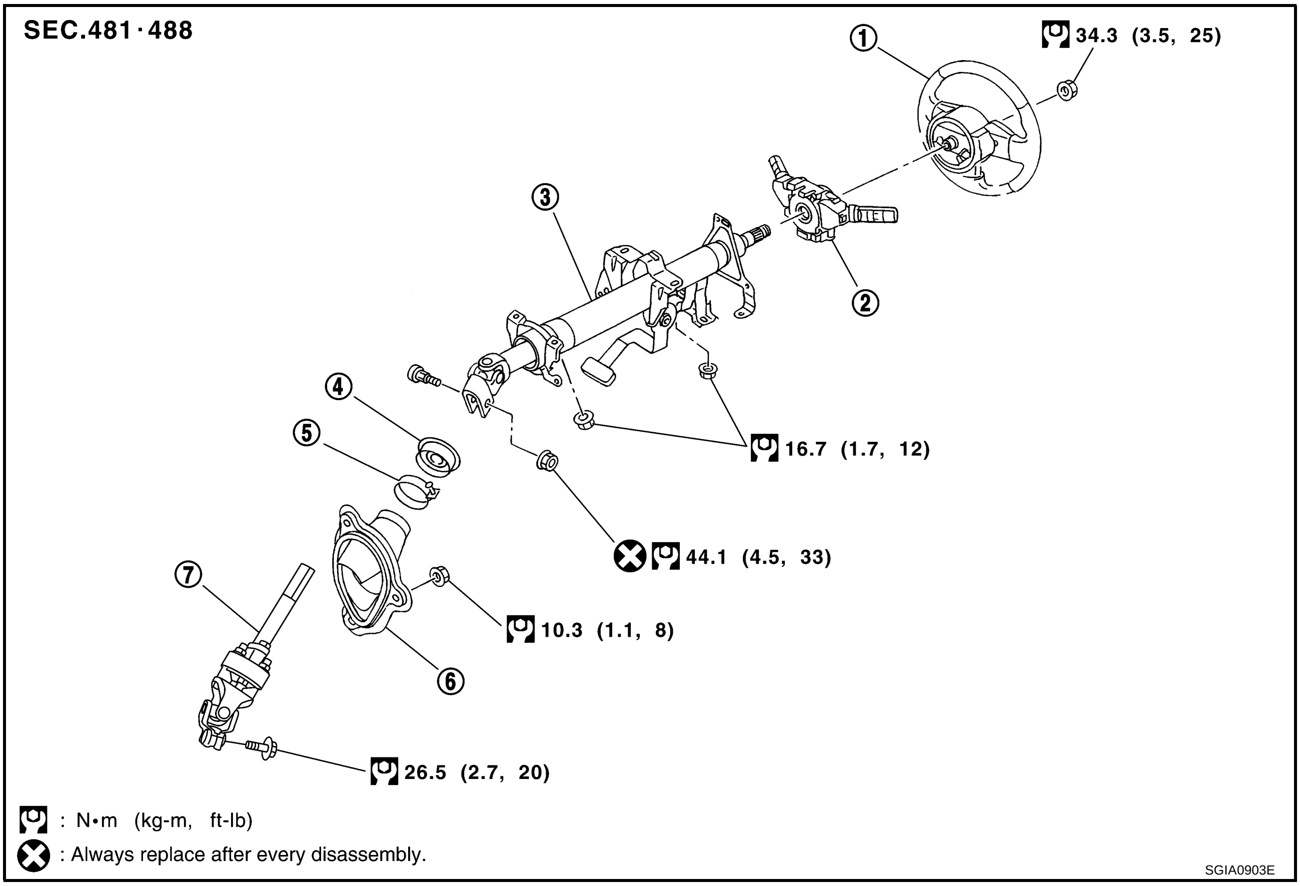
STEERING COLUMN

PFP:48810

Removal and Installation

AGS000KG

COMPONENT



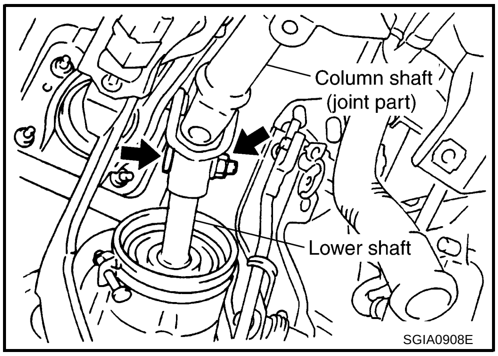
1. Steering wheel	2. Combination switch & spiral cable	3. Steering column assembly
4. Hole cover seal	5. Clamp	6. Hole cover
7. Lower shaft		

CAUTION:

- **Do not give axial impact to steering column assembly during removal and installation.**
- **Do not move steering gear when removing steering column assembly.**

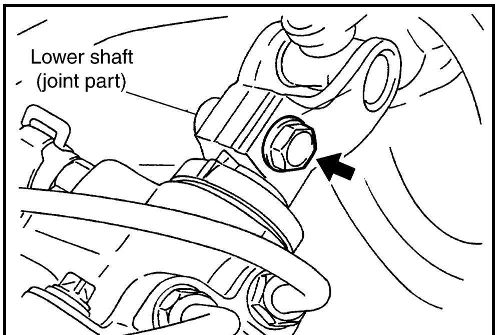
REMOVAL OF LOWER SHAFT, HOLE COVER, CLAMP AND HOLE COVER SEAL

1. Set vehicle to the straight-ahead position.
2. Remove fixing bolt and nut between column shaft (joint part) and lower shaft (upper side), and then separate lower shaft from column shaft (joint part).



3. Raise vehicle.

4. Remove fixing bolt of lower shaft (joint part), and then remove lower shaft from vehicle.
5. Lowering vehicle.
6. Loosen clamp, and then remove hole cover seal from hole cover.
7. Remove clamp and hole cover from dash panel.



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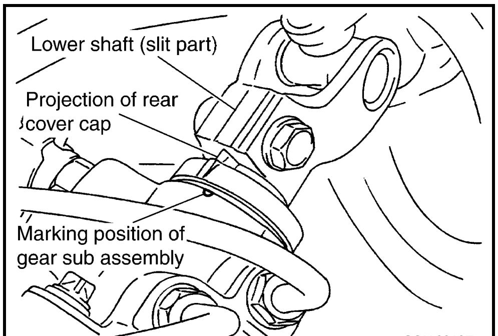
INSTALLATION OF LOWER SHAFT, HOLE COVER, CLAMP AND HOLE COVER SEAL

- Install in the reverse order of the removal. For tightening torque, refer to PS-12, "COMPONENT" .

  NOTE:
  Do not reuse non-reusable parts.
- When installing lower shaft to steering gear, follow the procedure listed below.
  - Set rack of steering gear in the neutral position.

    NOTE:
    To get the neutral position of rack, turn gear sub assembly and measure the distance of inner socket, and then measure the intermediate position of the distance.
  - Align rear cover cap projection with the projection of gear sub assembly.
  - Install slit part of lower shaft aligning with the projection of rear cover cap. Make sure that the slit part of lower shaft is aligned with both the projection of rear cover cap and the marking position of gear sub assembly.



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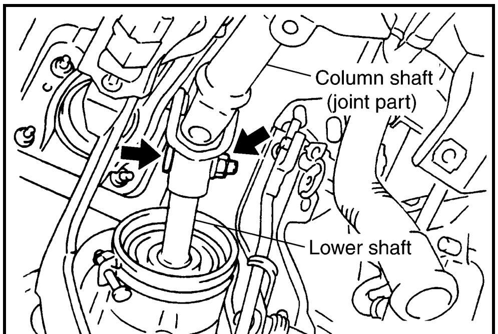
REMOVAL OF STEERING COLUMN ASSEMBLY

1. Set vehicle to the straight-ahead position.
2. Remove driver air bag module. Refer to SRS-32, "DRIVER AIR BAG MODULE" .
3. Remove steering wheel. Refer to PS-10, "Removal and Installation" .
4. Remove column cover, ignition key finisher and instrument driver lower panel. Refer to IP-10, "INSTRUMENT PANEL ASSEMBLY" .
5. Remove combination switch & spiral cable from steering column assembly. Refer to IP-10, "INSTRUMENT PANEL ASSEMBLY" .
6. Disconnect each switch connectors installed to steering column assembly, and then disconnect harness from steering column assembly.
7. Remove key interlock cable from steering column assembly. Refer to AT-258, "KEY INTERLOCK CABLE" .
8. Remove fixing bolt and nut between column shaft (joint part) and lower shaft (upper side), and then separate lower shaft from column shaft (joint part).



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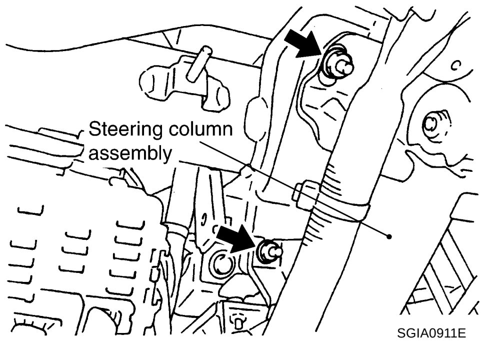
9. Remove steering column assembly mounting nuts, then remove steering column assembly from vehicle.



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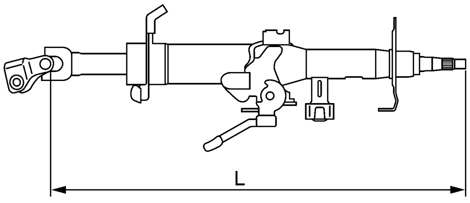
INSPECTION AFTER REMOVAL

- Check each part of steering column assembly and lower shaft for damage or other malfunctions. Replace if there are.
- Measure the length “L” as shown in the figure if vehicle has been involved in a minor collision. Replace steering column assembly if outside the standard.



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Steering column length “L”

: 542 - 544 mm (21.34 - 21.42 in)

- Measure steering column rotating torque using preload gauge. Replace steering column assembly if outside the standard.

Rotating torque

: 0 - 0.2 N·m (0 - 0.021 kg-m, 0 - 1 in-lb)

INSTALLATION OF STEERING COLUMN ASSEMBLY

Install in the reverse order of the removal. For tightening torque, refer to PS-12, "COMPONENT" .

NOTE:

Do not reuse non-reusable parts.

INSPECTION AFTER INSTALLATION

Make sure that steering wheel operates smoothly by turning several times from full left stop to full right stop.

Disassembly and Assembly

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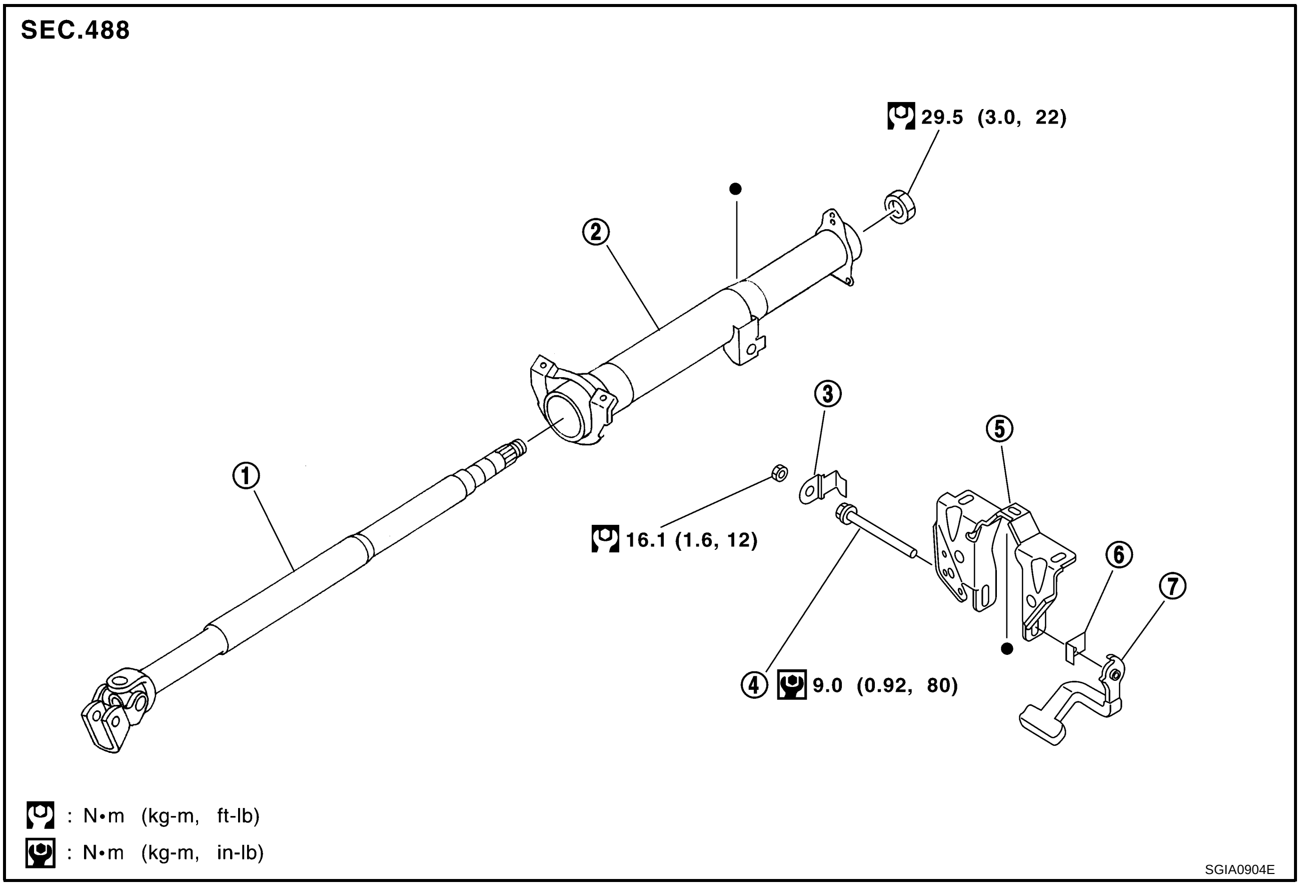
COMPONENT



1. Column shaft	2. Jacket tube	3. Adjusting stopper
4. Adjusting bolt	5. Column mounting bracket	6. Tilt lever stopper
7. Tilt lever		

DISASSEMBLY

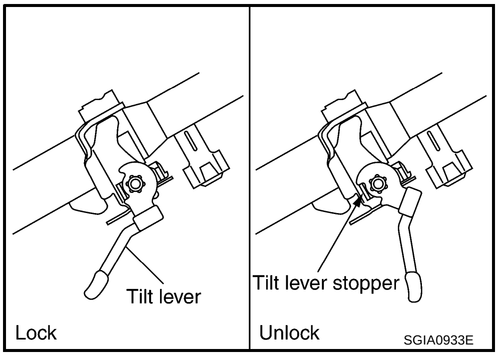
1. Remove the lock nut (for securing column shaft), and then remove column shaft from jacket tube.
2. Secure adjusting bolt, then remove lock nut (for securing tilt lever) and adjusting stopper.
3. Loosen adjusting bolt, and then remove tilt lever and tilt lever stopper.
4. Remove adjusting bolt and column mounting bracket from jacket tube.

INSPECTION AFTER DISASSEMBLY

- Check jacket tube and column shaft for deformation or damage. Replace if there are.
- Check tilt mechanism components for malfunction. Replace if there are.

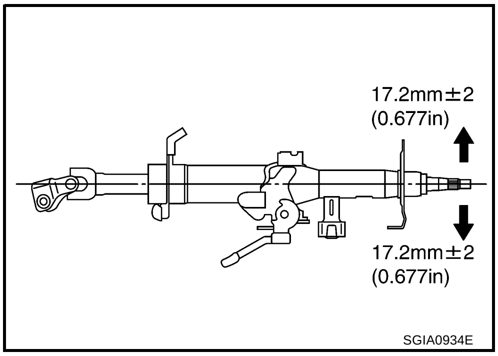
ASSEMBLY

- Assemble in the reverse order of the disassembly. For tightening torque, refer to PS-15, "COMPONENT" .
- Tighten lock nut (for securing tilt lever) to the specified torque so that tilt lever locks when tilt lever turns from unlock to lock. Refer to PS-16, "INSPECTION AFTER ASSEMBLY" .



INSPECTION AFTER ASSEMBLY

Check tilt mechanism operating range.



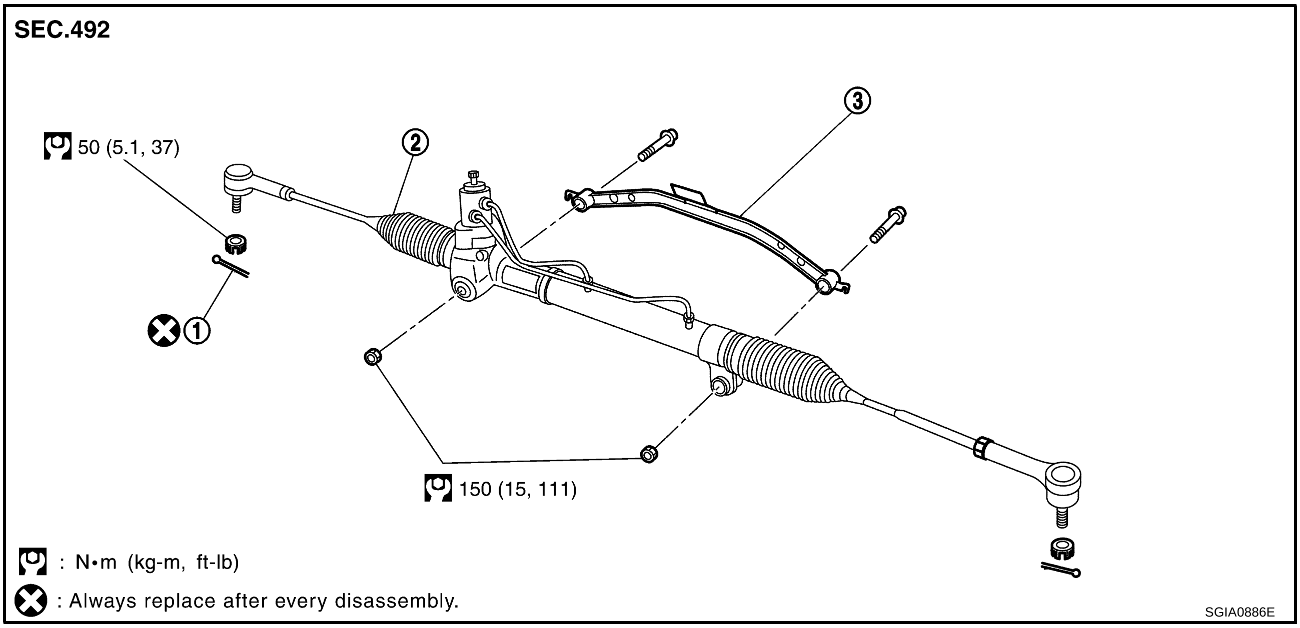
POWER STEERING GEAR AND LINKAGE

PFP:49001

Removal and Installation

AGS000KI

COMPONENT



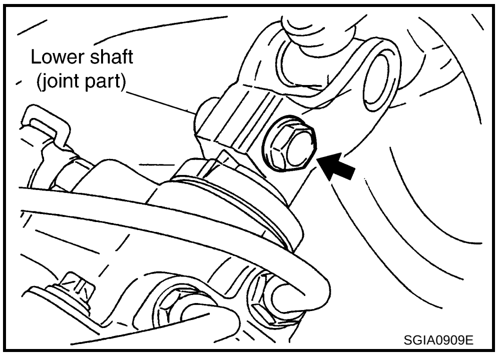
1. Cotter pin
2. Steering gear assembly
3. Power steering tube bracket

CAUTION:

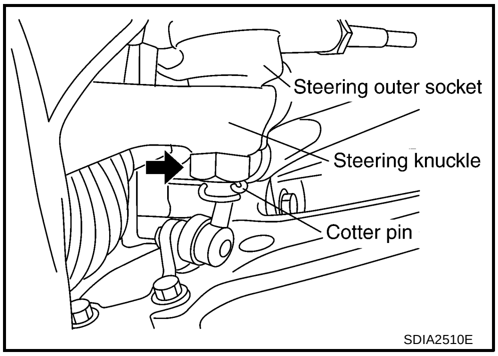
Spiral cable may be cut if steering wheel turns while separating steering column and steering gear assembly. Be sure to secure steering wheel using string to avoid turning.

REMOVAL

1. Set vehicle to the straight-ahead position.
2. Remove tires from vehicle with a power tool.
3. Remove stabilizer bar. Refer to FSU-16, "STABILIZER BAR" .
4. Remove fixing bolt of lower shaft (joint part), and then separate lower shaft from steering gear assembly.



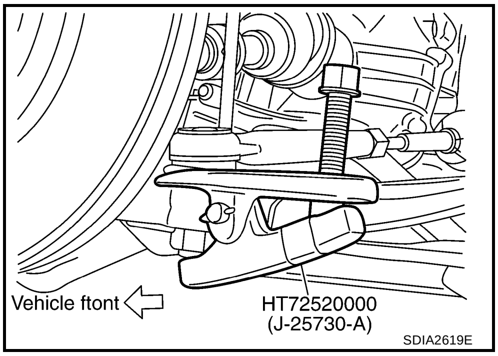
5. Remove cotter pin, and then loosen the nut.



6. Remove steering outer socket from steering knuckle so as not to damage ball joint boot using the ball joint remover [SST].

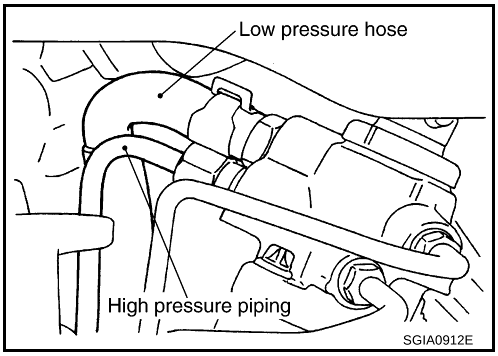
   CAUTION:

   Temporarily tighten the nut to prevent damage to threads and to prevent the ball joint remover [SST] from suddenly coming off.



SDIA2619E

7. Remove high-pressure piping and low-pressure hose of hydraulic piping, and then drain power steering fluid. Refer to PS-33, "HYDRAULIC LINE" .
8. Remove the power steering tube bracket mounting bolts and nuts, and then remove power steering tube bracket from steering gear assembly.
9. Tilt steering gear assembly to prevent any contact with other parts and then remove it from right side of vehicle.



SGIA0912E

INSTALLATION

Install in the reverse order of the removal. For tightening torque, refer to PS-17, "COMPONENT" .

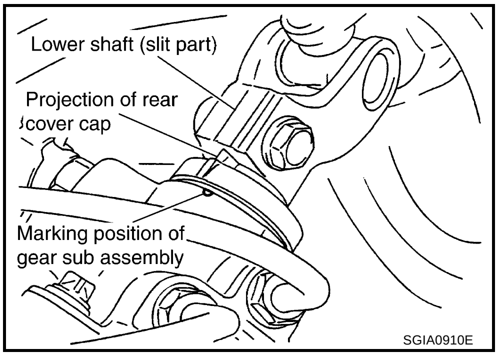
NOTE:

Do not reuse non-reusable parts.

- When installing lower shaft to steering gear, follow the procedure listed below.
  - Set rack of steering gear in the neutral position.

    NOTE:

    To get the neutral position of rack, turn gear sub assembly and measure the distance of inner socket, and then measure the intermediate position of the distance.
  - Align rear cover cap projection with the projection of gear sub assembly.
  - Align slit part of lower shaft with the projection of rear cover cap. And then install it onto rear cover cap of steering gear. Make sure that the slit part of lower shaft is aligned with both the projection of rear cover cap and the marking position of gear sub assembly.
  - After installation, bleed air from the steering hydraulic system. Refer to PS-7, "Air Bleeding Hydraulic System" .
  - Perform final tightening of nuts and bolts on each part under unladen conditions with tires on level ground when removing steering gear assembly. Check wheel alignment. Refer to FSU-6, "Wheel Alignment Inspection" .



SGIA0910E

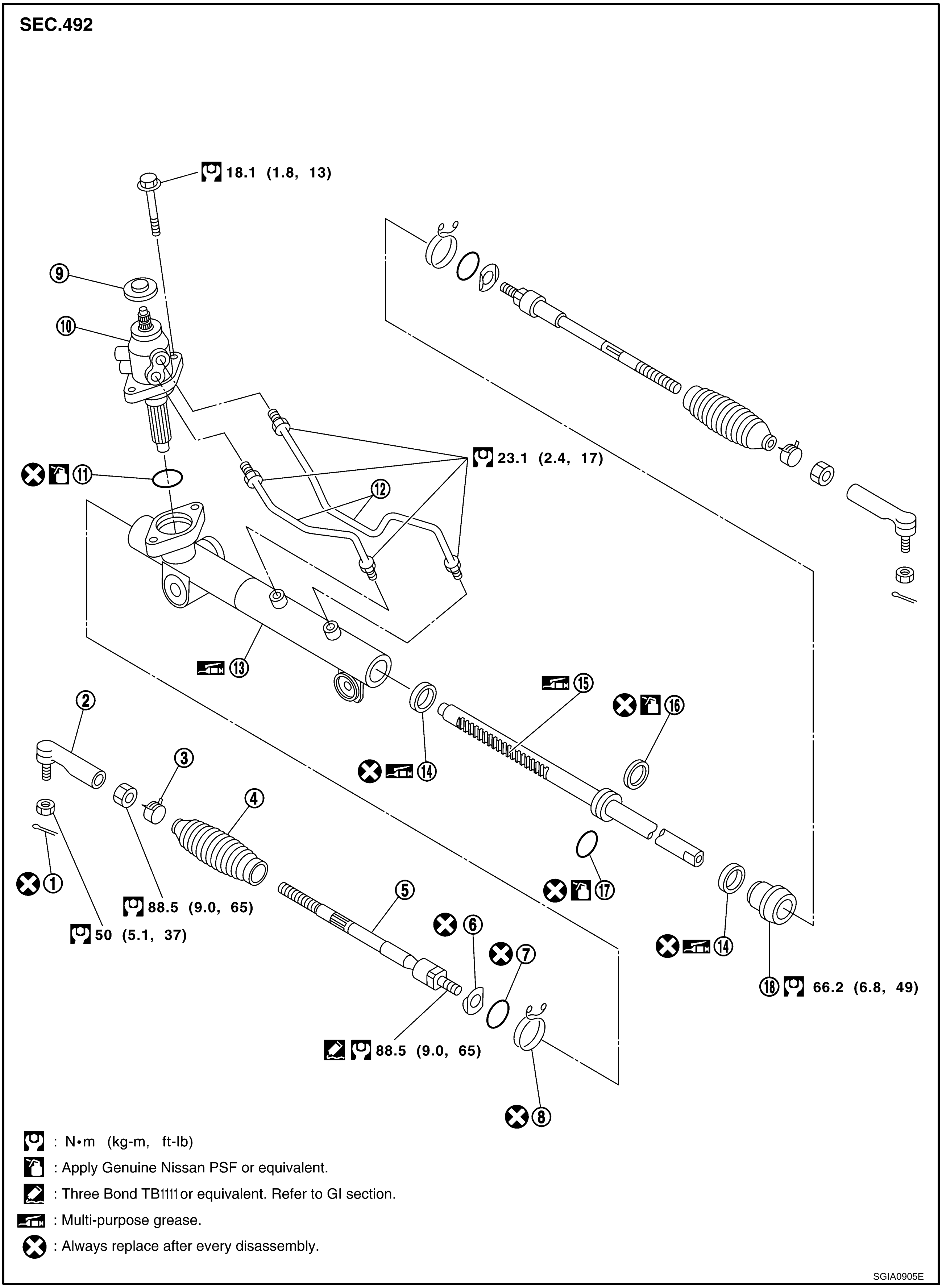
INSPECTION AFTER INSTALLATION

Make sure that steering wheel operates smoothly by turning several times from full left stop to full right stop.

Disassembly and Assembly

AGS000KJ

COMPONENT



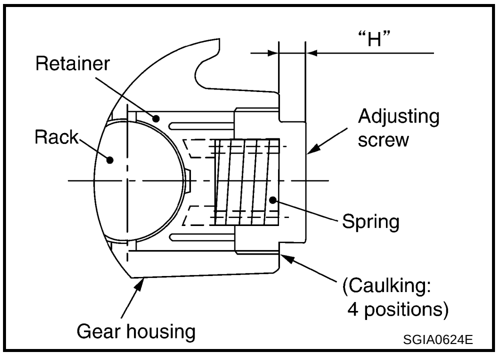
1. Cotter pin	2. Outer socket	3. Boot clamp
4. Boot	5. Inner socket	6. Lock plate
7. Spacer ring	8. Boot clamp	9. Rear cover cap
10. Gear sub assembly	11. O-ring A	12. Cylinder tubes
13. Gear housing assembly	14. Rack oil seal	15. Rack assembly
16. Rack Teflon ring	17. O-ring B	18. End cover assembly

CAUTION:
- **Disassemble and assemble steering gear by securing the mounting area in a vise using copper plates.**
- **Clean steering gear with kerosene before disassembling. Be careful to avoid splashing or applying any kerosene over connector of discharge port or return port.**

DISASSEMBLY

1. Remove cylinder tubes from gear housing assembly.
2. Remove rear cover cap from gear sub assembly.
3. Measure adjusting screw height “H”, and loosen adjusting screw.

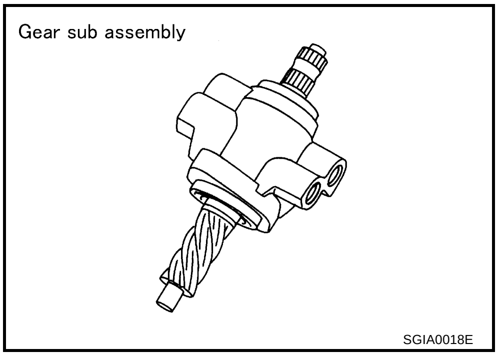
   CAUTION:
   - **Do not loosen adjusting screw 2 turns or more.**
   - **Replace steering gear assembly if adjusting screw is loosened 2 turns or more and it is removed.**



SGIA0624E

4. Remove mounting bolts of gear sub assembly, then remove gear sub assembly from gear housing assembly.

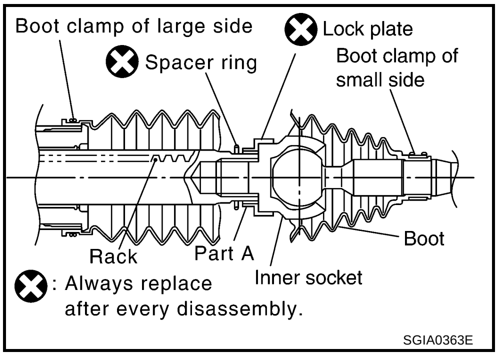
   CAUTION:
   Do not overhaul gear sub assembly because it is non overhaul part. If there is something wrong with gear sub-assembly, change it to new one.
5. Remove O-ring A from gear housing assembly.
6. Loosen outer socket lock nut, and remove outer socket.



SGIA0018E

7. Remove boot clamp on the small and big ends, and remove boot.

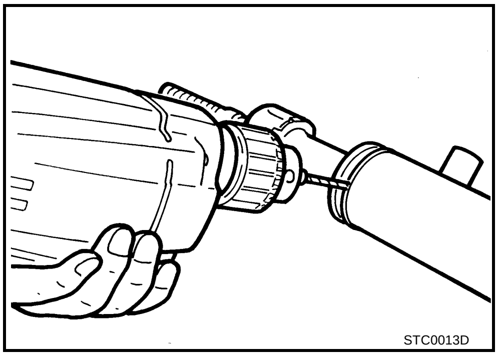
   CAUTION:
   Do not damage inner socket and gear housing assembly when removing boot. Inner socket and gear housing assembly must be replaced if inner socket and gear housing assembly are damaged because it may cause foreign material interfusion.
8. Move spacer ring to rack assembly side, raise caulking part (at two points of part A) of lock plate and loosen inner socket, then remove inner socket from rack assembly.



SGIA0363E

   CAUTION:
   When removing lock plate, be careful not to damage the surface of rack assembly. If damaged rack assembly surface will cause oil leak. Therefore, if the rack assembly surface is damaged, replace rack assembly.

9. Drill out the punch crimping part of gear housing assembly outer rim with a 3 mm (0.12 in) drill bit. [Drill for approximately 1.5 mm (0.059 in) depth.]



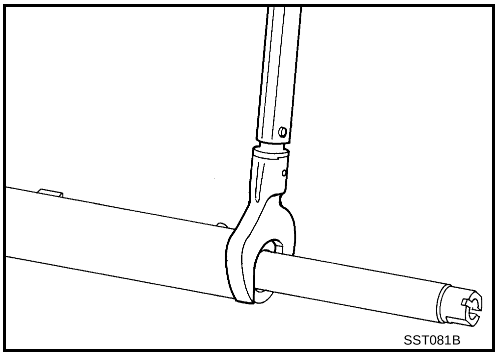
STC0013D

10. Remove end cover assembly with a 36 mm (1.42 in) open head (suitable tool).

    CAUTION:
    Do not damage rack assembly surface when removing. Rack assembly must be replaced if damaged because it may cause oil leakage.

11. Pull rack assembly together with rack oil seal out from gear housing assembly.

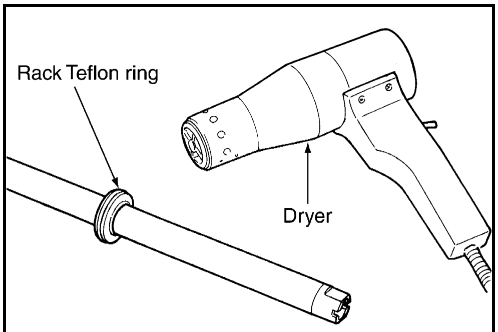
    CAUTION:
    Do not damage cylinder inner wall when removing rack assembly. Gear housing assembly must be replaced if damaged because it may cause oil leakage.



SST081B

12. Heat rack Teflon ring to approximately 40°C (104°F) with a dryer, and remove rack Teflon ring and O-ring B from rack assembly.

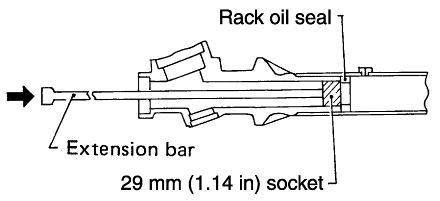
    CAUTION:
    Do not damage rack assembly. Rack assembly must be replaced if damaged because it may cause oil leakage.



SGIA0151E

13. Push rack oil seal inside with a 29 mm (1.14 in) socket and an extension bar to push out rack oil seal from gear housing assembly.

    CAUTION:
    Do not damage gear housing assembly and cylinder inner wall. Gear housing assembly must be replaced if damaged because it may cause oil leakage.



SGIA0179E

INSPECTION AFTER DISASSEMBLY

Boot

Check boot for cracks. Replace if there are.

Rack Assembly

Check rack assembly for damage or wear. Replace if there are.

Gear Sub Assembly

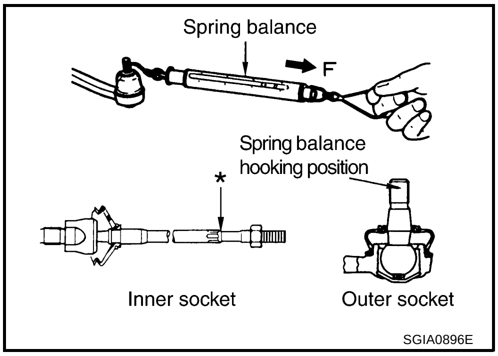
- Check pinion gear for damage or wear. Replace if there are.
- Rotate pinion and check for torque variation or rattle. Replace if there are.

Gear Housing Assembly

Check gear housing assembly for damage and scratches (inner wall). Replace if there are.

Outer Socket and Inner Socket

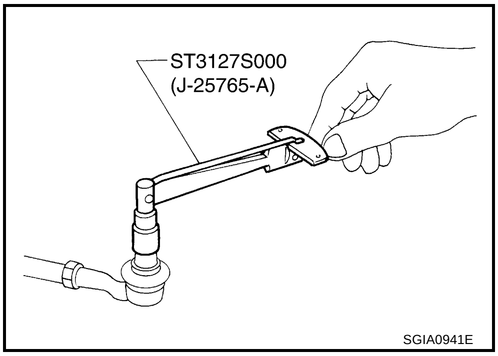
1. Swinging torque
   - Hook a spring balance at the point shown in the figure and pull the spring balance. Make sure that the spring balance reads the specified value when ball stud and inner socket start to move. Replace outer socket and steering gear assembly if they are outside the standard.



Items	Outer socket	Inner socket
Measuring point of spring balance	Stud cotter pin mounting hole	Measuring point at * mark shown in the figure
Swinging torque	0.3 - 2.9 N·m (0.03 - 0.29 kg-m, 3.0 - 25 in-lb)	1.0 - 7.8 N·m (0.10 - 0.80 kg-m, 9.0 - 69 in-lb)
Spring balance measurement	4.84 - 47.4 N (0.49 - 4.84 kg, 1.08 - 10.7 lb)	5.2 - 41 N (0.53 - 4.1 kg, 1.17 - 9.07 lb)

2. Rotating Torque
   - Make sure that the reading is within the following specified range using the preload gauge [SST]. Replace outer socket if the reading is outside the specified value.

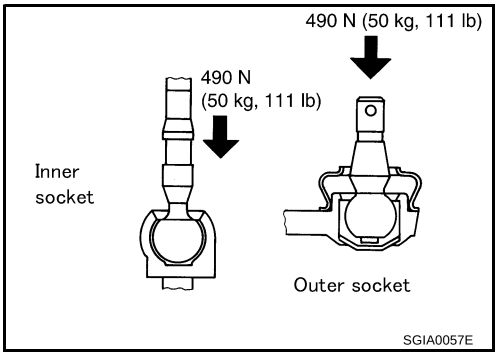
Outer socket rotating torque	0.3 - 2.9 N·m (0.03 - 0.29 kg-m, 3.0 - 25 in-lb)



3. Axial end play
   - Apply an axial load of 490 N (50 kg, 111 lb) to ball stud using a dial indicator. Measure amount of stud movement, and then make sure that the value is within the following specified range. Replace outer socket and steering gear assembly if the measured value is outside the standard.

     Outer socket : 0.5 mm (0.02 in) or less

     Inner socket : 0.2 mm (0.008 in) or less



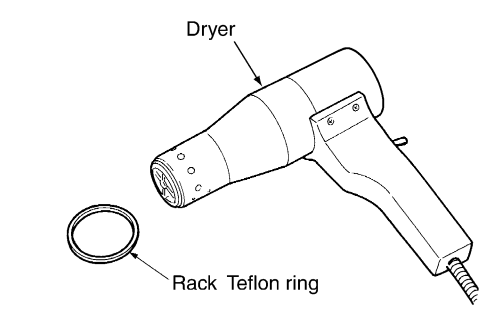
ASSEMBLY

1. Apply Genuine Nissan PSF or equivalent to O-ring B. Put an O-ring B into rack Teflon ring.

   NOTE:
   Do not reuse O-ring B.

2. Heat rack Teflon ring to approximately 40°C (104°F) with a dryer. Assemble it to mounting groove of rack assembly.

   NOTE:
   Do not reuse rack Teflon ring.

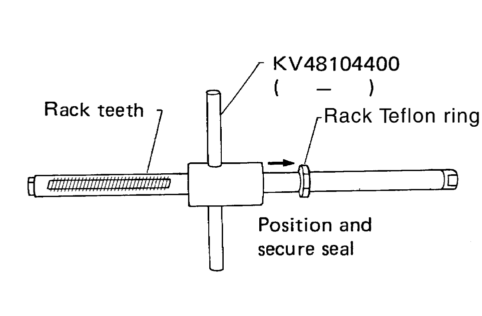


SGIA0153E

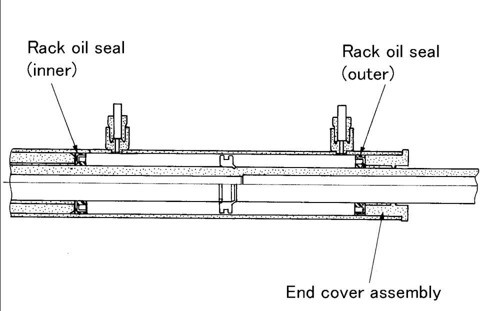
3. Install the Teflon ring correcting tool [SST] from tooth side of rack to fit rack Teflon ring on rack. Compress the ring with tool.
4. Apply multi-purpose grease to rack oil seal and install rack oil seal, and then assemble rack assembly to gear housing assembly.

   NOTE:
   Do not reuse rack oil seal.

   CAUTION:
   - **Do not damage retainer sliding surface by rack assembly. Replace gear housing assembly if damaged.**
   - **Do not damage gear housing assembly inner wall by rack assembly. Gear housing assembly must be replaced if damaged because it may cause oil leakage.**
   - **Install rack oil seal in a direction so that the lip of inner oil seal and the lip of outer oil seal face each other.**

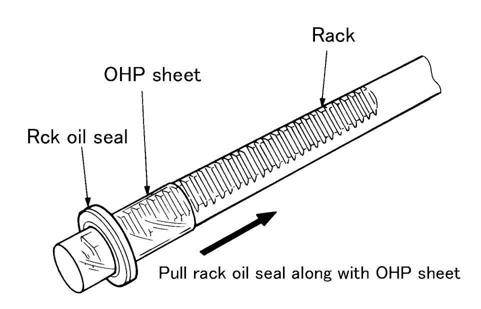


SGIA0154E



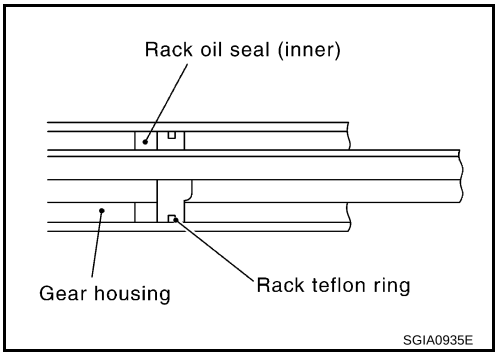
SGIA0205E

a. Wrap an OHP sheet [approximately 70 mm (2.76 in) × 100 mm (3.94 in).] Around rack assembly teeth to avoid damaging rack oil seal (inner). Install rack oil seal over sheet. Then, pull oil seal along with OHP sheet until they pass rack assembly teeth, and remove OHP sheet.



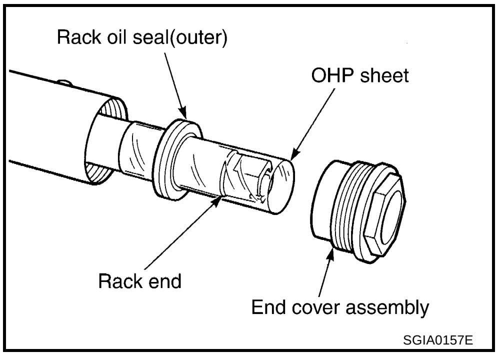
SGIA0097E

b. Insert rack oil seal (inner) into rack assembly piston (rack Teflon ring). Push retainer to adjusting screw side by hand, and move the rack assembly inside the gear housing assembly so that the rack oil seal (inner) can be pressed against the gear housing assembly.



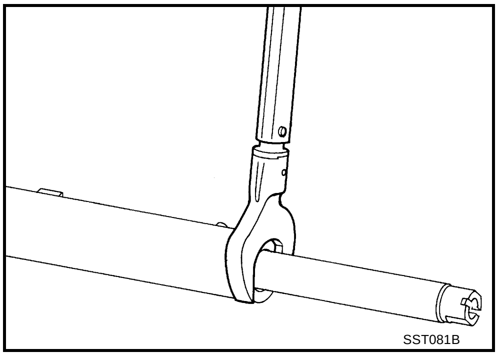
c. Wrap an OHP sheet [approximately 70 mm (2.76 in) × 100 mm (3.94 in).] Around the edge to avoid damaging rack oil seal (outer). Install rack oil seal over sheet. Then, pull oil seal along with OHP sheet until they pass rack edge, and remove OHP sheet.

d. Install end cover assembly to rack edge, and move rack assembly until it contacts with gear housing assembly.



5. Tighten end cover assembly to specified torque using a 36 mm (1.42 in) open head (suitable tool).

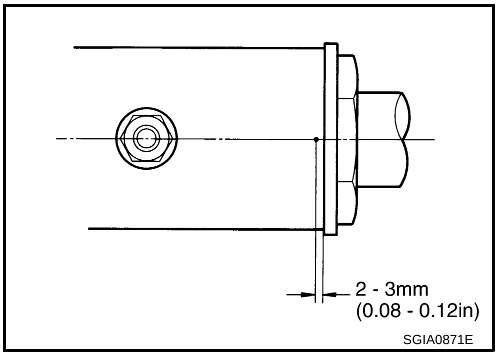
CAUTION:
Do not damage rack assembly. Replace it if damaged because it may cause oil leakage.



6. Crimp gear housing assembly at one point using a punch as shown in the figure so as to prevent end cover assembly from getting loose after tightening end cover assembly.
7. Apply Genuine Nissan PSF or equivalent to O-ring A, and then install O-ring A to gear housing assembly.

NOTE:
Do not reuse O-ring A.

8. Install gear sub assembly to gear housing assembly.



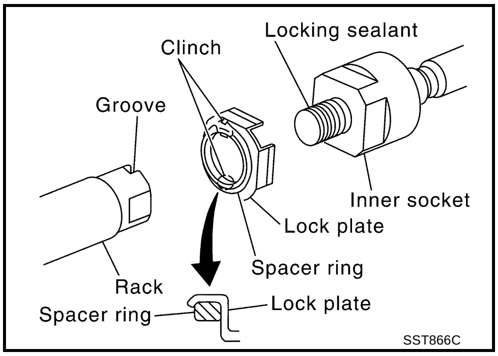
9. Install inner socket to rack assembly according to the instructions.

a. Attach spacer ring to rack assembly.

NOTE:
Do not reuse spacer ring.

b. Install lock plate to inner socket.

NOTE:
Do not reuse lock plate.



c. Apply locking sealant (Three Bond TB1111 or equivalent) to the thread of inner socket. Screw inner socket into rack assembly and tighten at the specified torque.

d. Clinch lock plate at two points on rack groove.

e. Install spacer ring to lock plate as shown in the figure.

CAUTION:

When installing spacer ring, avoid damaging it.

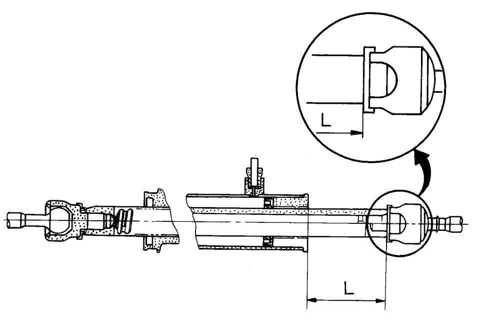
10. Decide on the neutral position for the rack.

    Rack stroke “L” : 66.5 mm (2.618 in)

11. Install rear cover cap to gear sub assembly.

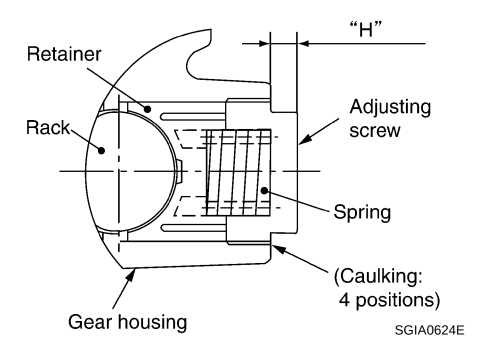
    CAUTION:

    Make sure that the projection of rear cover cap is aligned with the marking position of gear housing assembly.



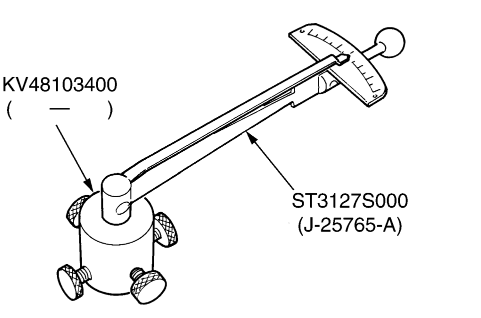
SGIA0629J

12. Apply a coat of Three Bond TB1111 or equivalent to the thread (2 turns thread), and then screw in the adjusting screw until it reaches height “H” from gear housing assembly measured before disassembling.
13. Move rack 10 strokes throughout the full stroke so that the parts can fit with each other.



SGIA0624E

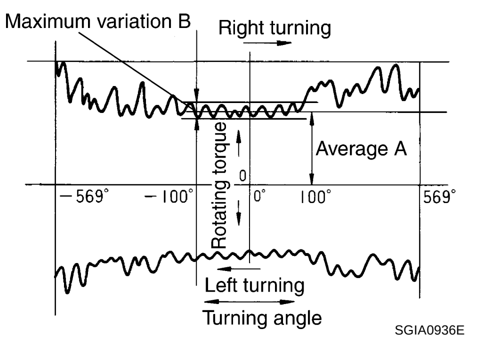
14. Measure pinion rotating torque within ±180° of neutral position of the rack using the preload gauge [SST] and preload adapter [SST]. Stop the gear at the point where highest torque is read.
15. Loosen adjusting screw and retighten to 5.4 N·m (0.55 kg-m, 48 in-lb), and then loosen by 20 to 40°.



SGIA0942E

16. Measure pinion rotating torque using the steering gear preload adapter [SST] and preload gauge [SST] to make sure that the measured value is within the standard. Readjust if the value is outside the standard. Replace gear assembly if the value is out side the standard after readjusting or adjusting screw rotating torque is 5 N·m (0.51 kg-m, 44 in-lb) or less.

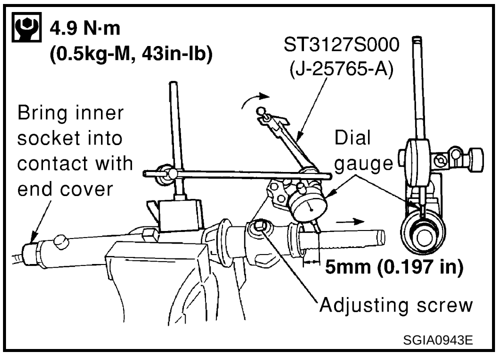
Pinion rotating torque standard	
Around neutral position (Within±100°) Average A	**1.67 – 2.25 N·m (0.17 – 0.22 kg-m, 1.3 – 1.6 ft-lb)**
Maximum variation B	**0.98 N·m (0.10 kg-m, 1 ft-lb)**



SGIA0936E

17. Apply a coat of Three Bond TB1111 or equivalent to inner socket and turn pinion fully to left with inner socket installed to gear housing assembly.

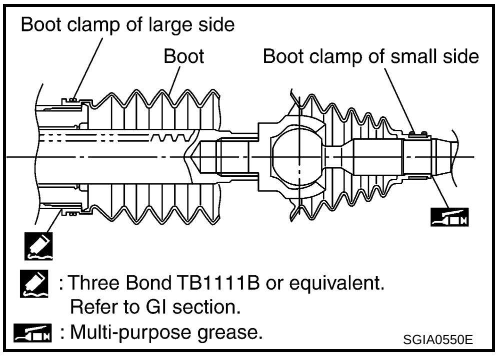
18. Set dial gauge as shown in the figure. Measure vertical movement of rack assembly when pinion is turned clockwise with torque of 4.9 N·m (0.5 kg-m, 43 in-lb). Readjust adjusting screw angle if the measured value is outside the standard. Replace gear assembly if the measured value is still outside the standard or adjusting screw rotating torque is 4.9 N·m (0.5 kg-m, 43 in-lb) or less.



SGIA0943E

Vertical movement of rack	0.265 mm (0.0104 in) or less	
Measuring point	Rack axial direction	5 mm (0.197 in) from housing end surface
	Rack radial direction	Axial direction of the adjusting screw

19. Install large end of boot to gear housing assembly.
20. Install small end of boot to inner socket boot mounting groove.
21. Install boot clamp to boot small end.



SGIA0550E

22. Install large side of boot clamp.

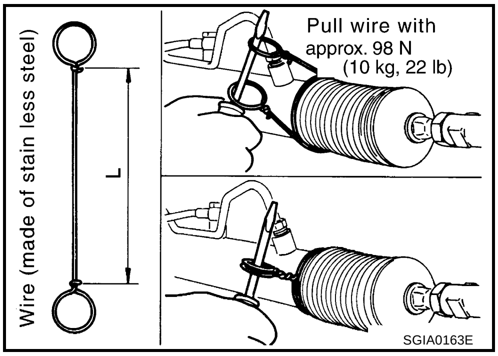
NOTE:

Do not reuse large side of boot clamp.

- Tighten large side of boot with boot clamp (stainless wire).

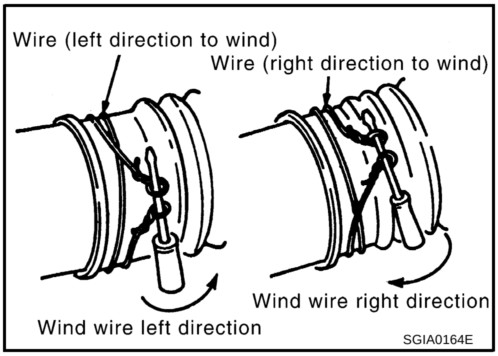
Wire length "L" : 370 mm (14.57 in)

- Wrap clamp around boot groove for two turns. Insert a flat-bladed screwdriver in loops on both ends of wire. Twist 4 to 4.5 turns while pulling them with force of approximately 98 N (10 kg, 22 lb).



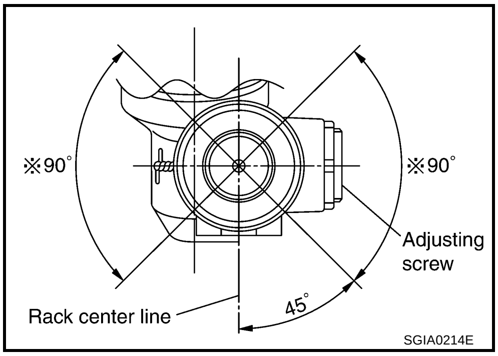
SGIA0163E

- Twist boot clamp as shown. Pay attention to relationship between winding and twisting directions.



SGIA0164E

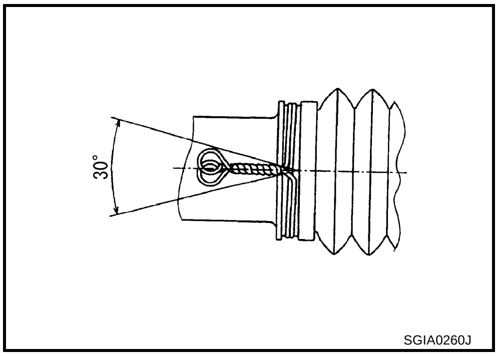
- Twisted point of clamp is in the opposite side of adjusting screw as shown in the figure (to prevent contact with other parts).



- Bent cut end of the wire toward rack axial as shown in the figure after twisting the wire 4 to 4.5 turns so that cut end does not contact with boot.

  CAUTION:
  Keep gap from cylinder tube 5 mm (0.20 in) or more.

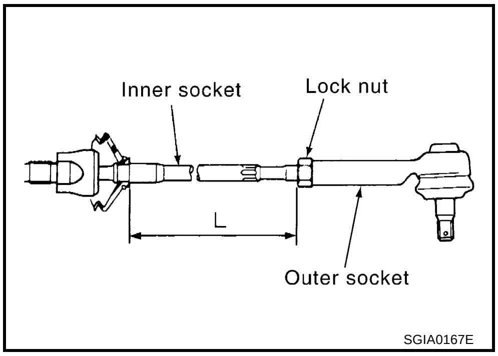
23. Install cylinder tube to gear housing assembly.



24. Adjust inner socket to standard length “L”, and then tighten lock nut to the specified torque. Refer to PS-19, "COMPONENT" . Check length of inner socket “L” again after tightening lock nut. Make sure that the length is the standard.

    Inner socket length “L”   169.67 mm (6.68 in)

    CAUTION:
    Adjust toe-in after this procedure. Length achieved after toe-in adjustment is not necessary the above value.



A
B
C
D
E
F
PS
H
I
J
K
L
M

POWER STEERING OIL PUMP

PFP:49110

On-Vehicle Inspection and Service

AGS000KK

CHECKING RELIEF OIL PRESSURE

CAUTION:

Make sure that belt tension is normal before starting the following procedure.

1. Connect the hydraulic pressure gauge [SST] between oil pump discharge connector and high-pressure hose. Bleed air from the hydraulic circuit while opening valve fully. Refer to PS-7, "Air Bleeding Hydraulic System" .
2. Start engine. Run engine until oil temperature reaches 50 to 80°C (122 to 176°F).

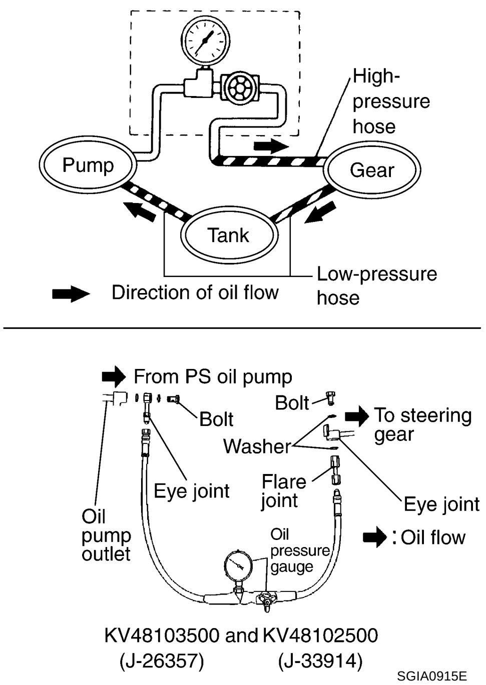
   CAUTION:

   - **Leave the valve of the hydraulic pressure gauge [SST] fully open while starting and running engine. If engine is started with the valve closed, the hydraulic pressure in oil pump goes up to the relief pressure along with unusual increase of oil temperature.**
   - **Be sure to keep hose clear of belts and other parts when engine is started.**
3. Fully close the hydraulic pressure gauge [SST] valve with engine at idle and measure the relief oil pressure.

Relief oil pressure:	**8,000 – 8,800 kPa (81.60 – 89.76 kg/cm^2 , 1,160 – 1,276 psi)**

   CAUTION:

   Never keep valve closed for 15 seconds or longer.
4. Open the valve slowly after measuring. Repair oil pump if the relief oil pressure is outside the standard. Refer to PS-29, "Disassembly and Assembly" .
5. After inspection, disconnect the hydraulic pressure gauge [SST] from hydraulic circuit, then add fluid and bleed air. Refer to PS-7, "Air Bleeding Hydraulic System" .



SGIA0915E

Removal and Installation

AGS000KL

REMOVAL

1. Drain power steering fluid from reservoir tank.
2. Loosen drive belt. Refer to EM-11, "DRIVE BELTS" .
3. Remove drive belt from oil pump pulley.
4. Remove union bolt and hose from oil pump.
5. Remove oil pump fixing bolts, and then remove power steering oil pump.

INSTALLATION

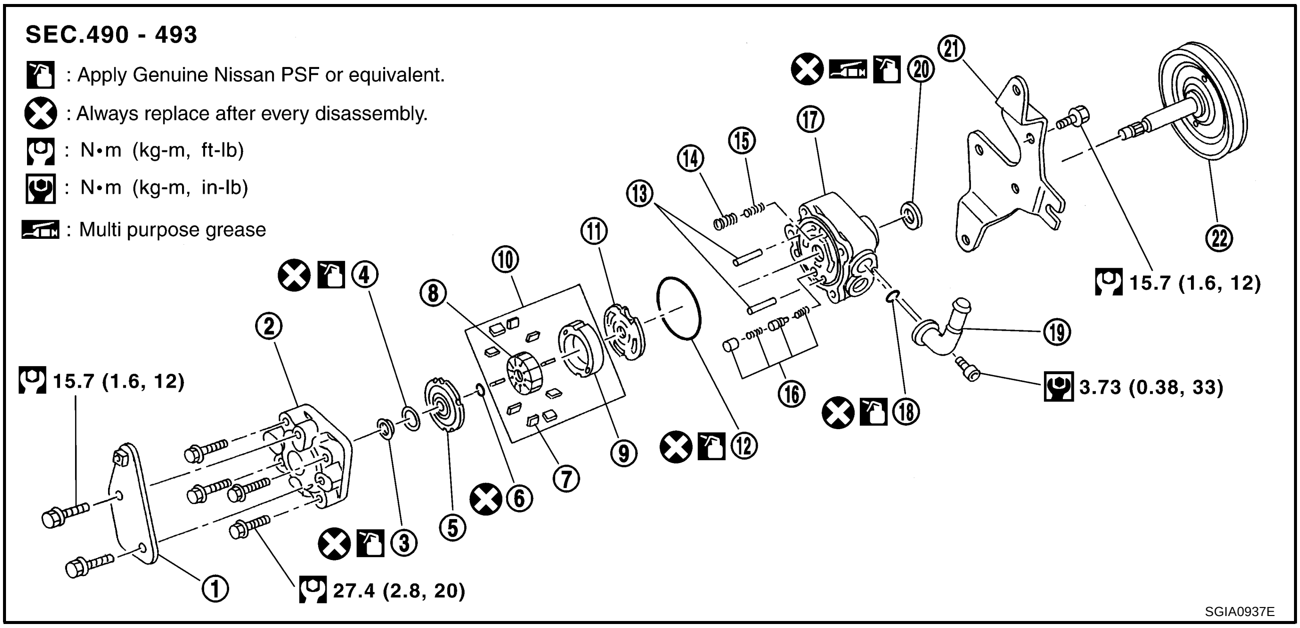
Install in the reverse order of the removal. For tightening torque, refer to PS-33, "HYDRAULIC LINE" .

- Perform the following procedure after installing.
  - Drive belt is auto tensioner type. Belt tension adjustment is not necessary.
  - Bleed air. Refer to PS-7, "Air Bleeding Hydraulic System" .

Disassembly and Assembly

AGS000KN

COMPONENT



1.	Rear bracket	2.	Rear cover	3.	Teflon ring
4.	O-ring A	5.	Rear side plate	6.	Rotor snap ring
7.	Vane	8.	Rotor	9.	Cam ring
10.	Cartridge	11.	Front side plate	12.	O-ring B
13.	Dowel pin	14.	Flow control valve A	15.	Flow control valve spring
16.	Flow control valve B assembly	17.	Body assembly	18.	O-ring C
19.	Suction pipe	20.	Oil seal	21.	Front bracket
22.	Pulley				

INSPECTION BEFORE DISASSEMBLY

Disassemble oil pump only when the following malfunctions occur.

- If oil leakage is found on oil pump.
- Oil pump pulley is damaged or deformed.
- Performance of oil pump is low.

DISASSEMBLY

NOTE:

Secure oil pump in a vise if necessary.

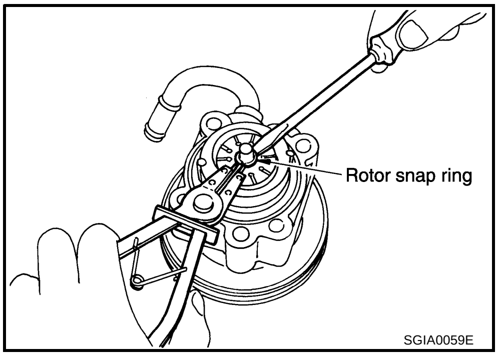
CAUTION:

Use copper plates when securing in a vise.

1. Remove rear bracket mounting bolts, and then remove rear bracket from rear cover.
2. Remove rear cover mounting bolts, and then remove rear cover from body assembly.
3. Remove rear side plate from cartridge, and then remove Teflon ring and O-ring A from rear side plate.
4. Remove rotor snap ring using a snap ring plier, and remove pulley from body assembly.

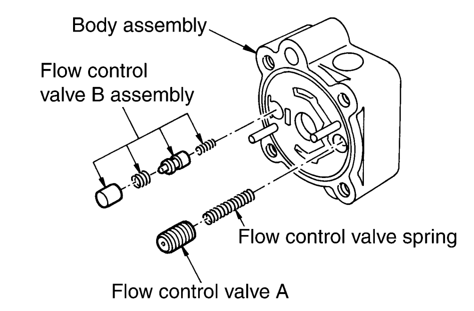
   CAUTION:

   Remove pulley so as not to be damaged when removing rotor snap ring.
5. Remove front bracket mounting bolts, and then remove front bracket from body assembly.



6. Remove cam ring, rotor, vane, front side plate, flow control valve A, flow control valve spring, flow control valve B assembly, and O-ring B from body assembly.

   CAUTION:
   Do not drop and damage flow control valve A and flow control valve B assembly when removing.
7. Remove oil seal from body assembly.
8. Remove suction pipe from body assembly.
9. Remove O-ring C from suction pipe.



SGIA0526E

INSPECTION AFTER DISASSEMBLY

Body Assembly and Rear Cover Inspection

Check body assembly and rear cover for internal damage. Replace rear cover if it is damaged. Replace oil pump assembly if body assembly is damaged.

Cartridge Assembly Inspection

Check cam ring, side plate, rotor and vane for damage. Replace cartridge assembly if there are.

Flow Control Valve Inspection

Check flow control valve A, flow control valve spring and flow control valve B assembly for damage. Replace if there are.

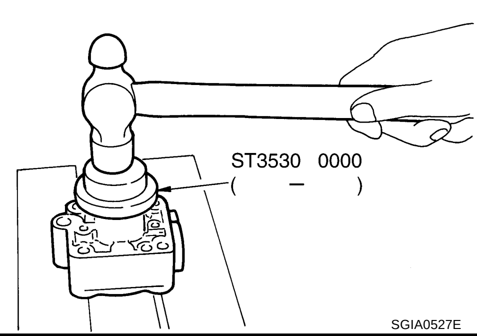
ASSEMBLY

NOTE:
Secure oil pump in a vise if necessary.

CAUTION:
Use copper plates when securing in a vise.

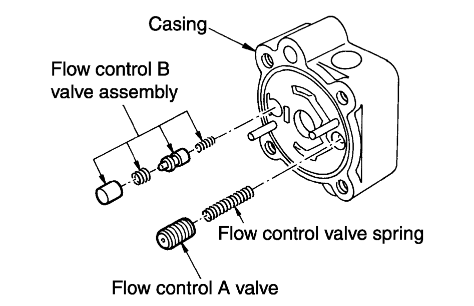
1. Apply a coat of multi purpose grease or equivalent to oil seal lips. Apply Genuine Nissan PSF or equivalent to around oil seal, and then install oil seal to body assembly using the drift [SST].

   NOTE:
   Do not reuse oil seal.
2. If dowel pin has been removed, insert it into body assembly by hand. If cannot be inserted by hand, lightly tap with a hammer.



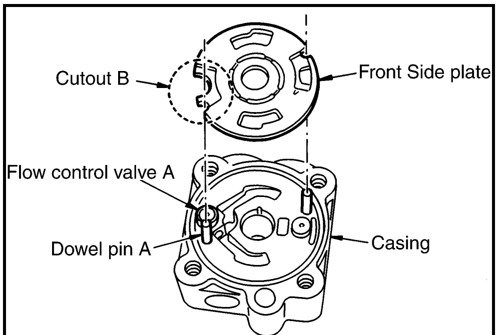
SGIA0527E

3. Install flow control valve A, flow control valve spring and flow control valve B assembly as shown in the figure.



SGIA0061E

4. Install front side plate with dowel pin A on flow control valve A side as shown in the figure aligning with front side plate cutout B to body assembly.

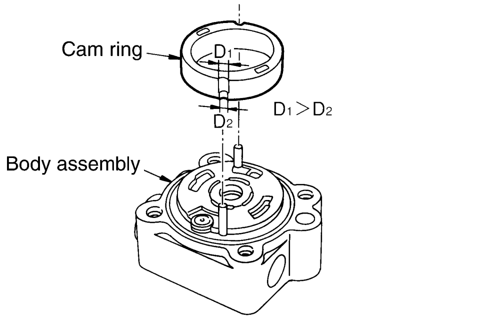


SGIA0528E

5. Install cam ring as shown in the figure.
6. Install front bracket to body assembly, and then tighten mounting bolts to the specified torque.
7. Install pulley to body assembly.

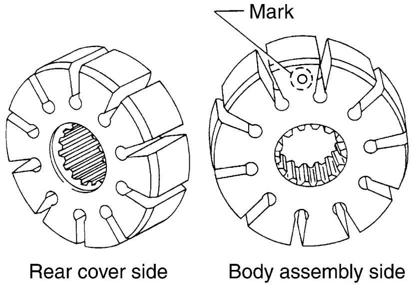
   CAUTION:

   Do not damage oil seal when installing pulley.



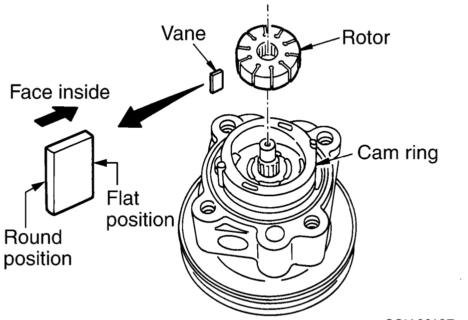
SGIA0612E

8. Install rotor so that mark faces rear cover side, and then install it to pulley shaft.



SGIA0874E

9. Install vane to rotor so that arc of vane faces cam ring side.



SGIA0613E

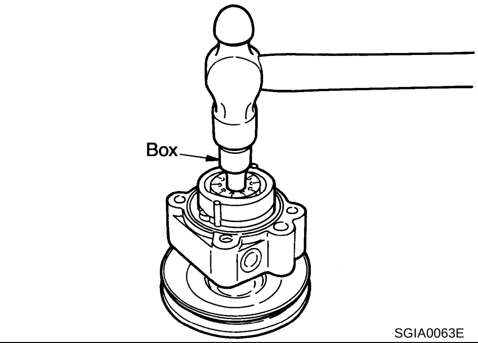
10. Install rotor snap ring to slit of pulley shaft using a hammer and a 10 mm (0.39 in) socket.

    NOTE:

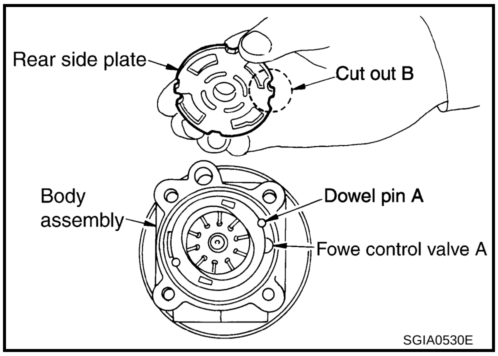
    Do not reuse rotor snap ring.

    CAUTION:

    - **Do not damage rotor and pulley shaft.**
    - **Power steering oil pump assembly must be replaced if rotor is damaged.**



SGIA0063E



11. Install rear side plate with dowel pin A on flow control valve A side as shown in the figure aligning with rear side plate cutout B to cartridge.
12. Apply Genuine Nissan PSF or equivalent to O-ring A, and then install O-ring A to rear side plate.

    NOTE:
    Do not reuse O-ring A.
13. Apply Genuine Nissan PSF or equivalent to Teflon ring, and then install Teflon ring to rear side plate.

    NOTE:
    Do not reuse Teflon ring.
14. Apply Genuine Nissan PSF or equivalent to O-ring B, and then install O-ring B to body assembly.

    NOTE:
    Do not reuse O-ring B.
15. Install rear cover to body assembly, and then tighten mounting bolts to the specified torque.
16. Apply Genuine Nissan PSF or equivalent to O-ring C, and then install O-ring C to suction pipe.

    NOTE:
    Do not reuse O-ring C.
17. Install suction pipe to body assembly.
18. Install rear bracket to rear cover, and then tighten mounting bolts to the specified torque.

HYDRAULIC LINE

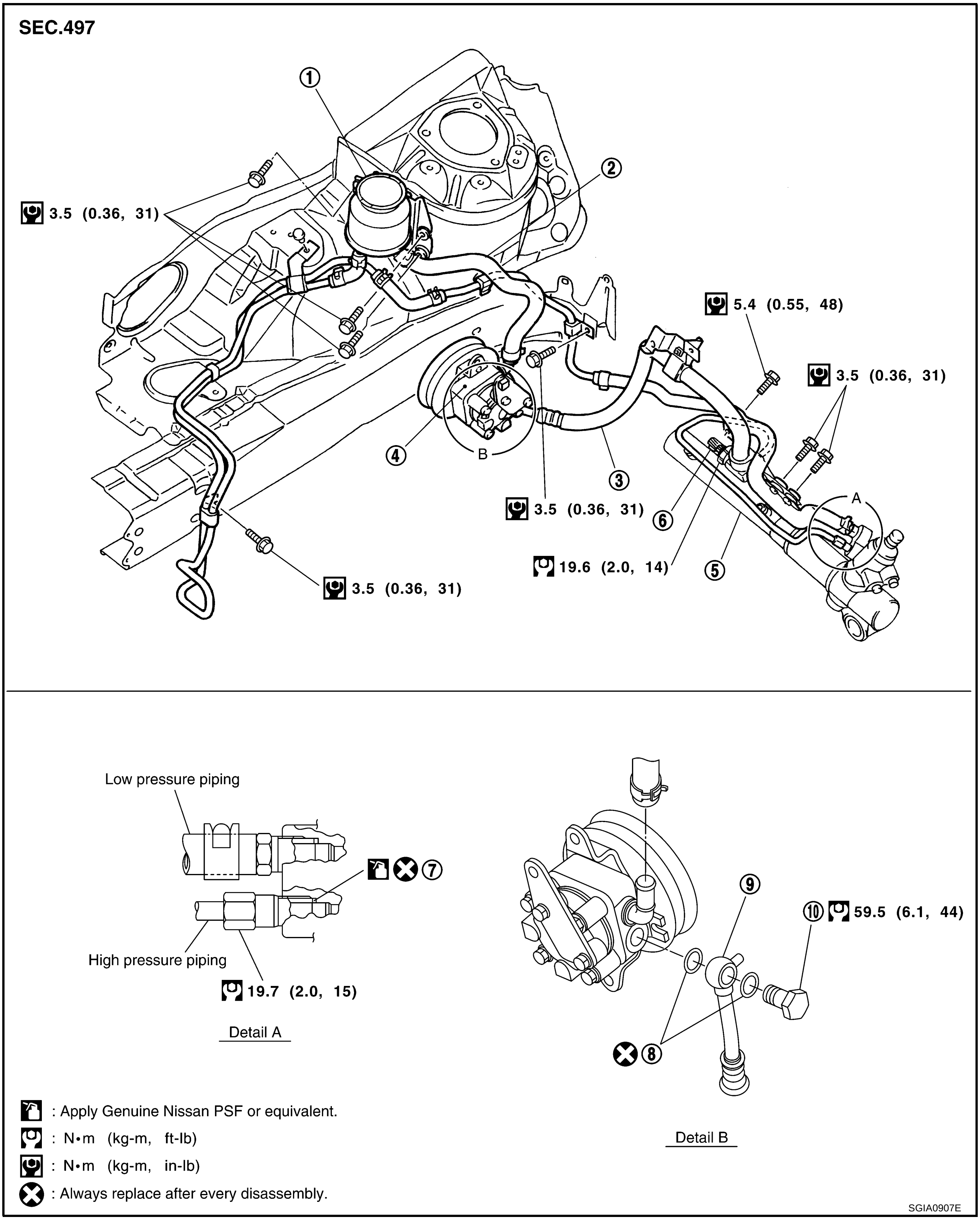
PFP:49721

Component

AGS000KP

CAUTION:

Securely insert harness connector to oil pressure sensor.



1. Reservoir tank	2. Suction hose	3. High-pressure hose
4. Oil pump assembly	5. Steering gear assembly	6. Pressure sensor

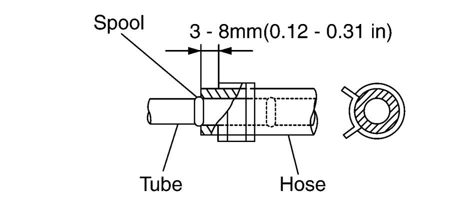
7. O-ring
8. Copper washer
9. Eye-joint (assembled to high-pressure side hose)
10. Eye-bolt

Removal and Installation

AGS000KQ

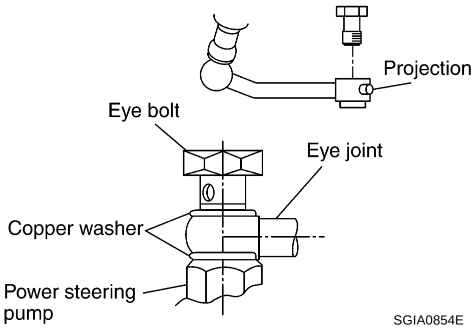
- Insert hose securely until it contacts tube spool.

  CAUTION:
  Do not apply fluid.



SGIA0514E

- Install eye-bolt with eye-joint (assembled to high-pressure hose) protrusion facing with pump side cutout, and then tighten it to the specified torque after tightening by hand.



SGIA0854E

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Steering Wheel

AGS000KT

Steering wheel axial end play	0 mm (0 in)
Steering wheel play	0 - 35 mm (0 - 1.38 in)

Steering Angle

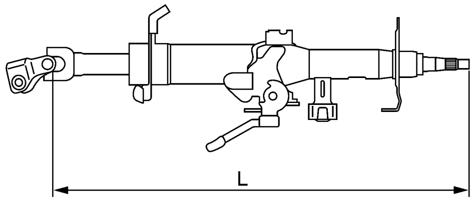
AGS000KU

Inner wheel Degree minute (Decimal degree)	Minimum	36° 00′ (36.0°)
	Nominal	39° 00′ (39.0°)
	Maximum	40° 00′ (40.0°)
Outer wheel Degree minute (Decimal degree)	Nominal	31° 00′ (31.0°)

Steering Column

AGS000KV

Steering column length "L"	542 - 544 mm (21.34 - 21.42 in)

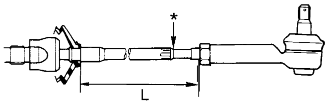


SGIA0932E

Steering Outer Socket and Inner Socket

AGS000KW

Steering gear type		PR24AD
Outer socket	Swinging torque	0.3 - 2.9 N·m (0.03 - 0.29 kg-m, 3.0 - 25 in-lb)
	Measurement on spring balance Measuring point: cotter pin hole of stud	4.84 - 47.4N (0.49 - 4.84 kg, 1.08 - 10.7 lb)
	Rotating torque	0.3 - 2.9 N·m (0.03 - 0.29 kg-m, 3.0 - 25 in-lb)
	Axial end play	0.5 mm (0.02 in) or less
Inner socket	Swinging torque	1.0 - 7.8 N·m (0.10 - 0.80 kg-m, 9.0 - 69 in-lb)
	● Measurement on spring balance ● Measuring point at* mark shown in the figure	5.2 - 41 N (0.53 - 4.1 kg, 1.17 - 9.07 lb)
	Axial end play	0.2 mm (0.008 in) or less
Inner socket length "L"		169.67 mm (6.68 in)

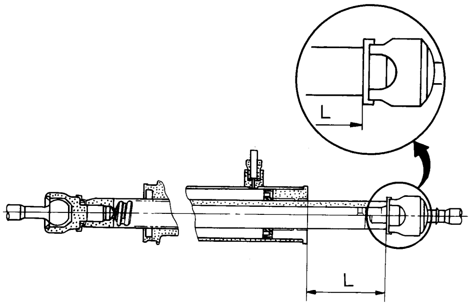


SGIA0950E

Steering Gear

AGS000KX

Steering gear model	PR24AD
Rack neutral position, dimension “L” (Rack stroke)	66.5 mm (2.618 in)



SGIA0629J

Oil Pump

AGS000KY

Oil pump relief hydraulic pressure	8,000 - 8,800 kPa (81.60 - 89.76 kg/cm^2 , 1,160 - 1,276 psi)

Steering Fluid

AGS000KZ

Fluid capacity	Approx. 1.0 ℓ (1 - 1/8 US qt, 7/8 Imp qt)